REMARKS/ARGUMENTS

Reconsideration and allowance of this application are respectfully requested. Currently, claims 1, 3, 5, 7, 11, 13, 17, 19, 23, 25, 27, 29, 31, 33, 35, 37, 39, 43, 45, 49-51, 53, 59, 61, 67, 69 and 75-144 are pending in this application.

Rejections Under 35 U.S.C. §102 and §103:

Claims 1, 3, 5, 7, 11, 13, 17, 19, 23, 25, 27, 35, 37, 39, 43, 45, 47, 49-51, 53, 59, 61, 75-85, 89-92 and 94-97 were rejected under 35 U.S.C. §102(b) as allegedly being anticipated by, or in the alternative under 35 U.S.C. §103 as being obvious over Suzuki et al. (U.S. '940, hereinafter "Suzuki").[1] Applicant respectfully traverses these rejections.

Anticipation under Section 102 of the Patent Act requires that a prior art reference disclose every claim element of the claimed invention. See, e.g., *Orthokinetics, Inc. v. Safety Travel Chairs, Inc.*, 806 F.2d 1565, 1574 (Fed. Cir. 1986). In order to establish a *prima facie* case of obviousness, all of the claim limitations must be taught or suggested by the prior art. Suzuki fails to disclose, teach or suggest every claim element of the claimed invention. For example, Suzuki fails to disclose, teach or suggest "wherein a width of the limiting current region within the voltage level range varies due to the decomposition of the water in accordance with the oxygen concentration such that the width of the limiting current region is wide in a lean region of the air-fuel ratio while the limiting current region is narrow in a rich region of the air-fuel ratio, wherein the width of the limiting current region in the lean region becomes larger as the air-fuel ratio is increased, and wherein the second voltage point, at which the decomposition

[1] Applicant notes that the named inventors of the Suzuki reference (U.S. '940) are also named among the inventors in the present application. Applicant further notes that assignee of the Suzuki reference is the same as that of the present application.

of the water starts, varies according to the air-fuel ratio," as required by independent claim 1 and its dependents. Similar comments apply to the remaining independent claims.

The first of the above-noted claim limitations ("a width of the limiting current region within the voltage level range varies due to the decomposition of the water in accordance with the oxygen concentration such that the width of the limiting current region is wide in a lean region of the air-fuel ratio while the limiting current region is narrow in a rich region of the air-fuel ratio") is supported by, for example, page 4, lines 13-15 and page 20, lines 16-19 of the present specification. The second of the above-noted claim limitations ("the width of the limiting current region in the lean region becomes larger as the air-fuel ratio is increased") is supported by, for example, page 23, lines 7-9 of the present specification. The third of the above-noted claim limitations ("the second voltage point, at which the decomposition of the water starts, varies according to the air-fuel ratio") is supported by, for example, page 22, lines 18-24 and page 24, lines 9-12 of the present specification.

In the invention of claim 1, the second voltage point of the limiting current region is determined at the value at which the decomposition of the water starts. As is known, the concentration of the water contained in the exhaust gas varies with the air-fuel ratio. As the air-fuel ratio is increased, the concentration of the water is decreased. That is, as is known, the decomposition voltage of the water is increased with the air-fuel ratio.

In contrast to the second voltage point of the limiting current region being determined at the value at which the decomposition of the water starts, V-I characteristics of an A/F sensor shown in fig. 3 of Suzuki are determined when the sensor is put into a model gas without considering the decomposition voltage of water contained in the model gas. Therefore, Suzuki

fails to teach or even suggest the limitation of "a width of the limiting current region varies due to the decomposition of the water in accordance with the oxygen concentration such that the width of the limiting current region is wide in a lean region of the air-fuel ratio while the limiting current region is narrow in a rich region of the air-fuel ratio" or the limitation of "the width of the limiting current region in the lean region becomes larger as the air-fuel ratio is increased", as required by claim 1. Similar comments apply to the remaining independent claims.

For at least the above reasons, Applicant requests that the various rejections under 35 U.S.C. §102 and §103 over Suzuki be withdrawn.

Claims 1, 3, 5, 7, 11, 13, 17, 19, 23, 25, 27, 35, 37, 39, 43, 45, 47, 49-51, 53, 59, 61, 75-85, 89-92 and 94-97 were rejected under 35 U.S.C. §103 as allegedly being unpatentable over Suzuki in view of JP '388. Claims 29, 31, 33 and 86-88 were rejected under 35 U.S.C. §103 over the three-way combination of Suzuki in view of JP '388 and in further view of Okazaki et al. (U.S. '641, hereinafter "Okazaki"). Claims 67, 69, 93 and 98 were rejected under 35 U.S.C. §103 as allegedly being unpatentable over the three-way combination of Suzuki in view of JP '388 in further view of Suzuki et al. (U.S. '773, hereinafter "Suzuki '773"). None of these secondary or tertiary references resolve the above-described deficiencies of Suzuki with respect to "a limiting current region within a voltage level range between a first voltage point...and a second voltage point, at which a decomposition of water contained in the exhaust gas starts" and "wherein a width of the limiting current region within the voltage level range varies due to the decomposition of the water in accordance with the oxygen concentration such that the width of the limiting current region is wide in a lean region of the air-fuel ratio while the limiting current region is narrow in a rich region of the air-fuel ratio, wherein the width of the limiting current

region in the lean region becomes larger as the air-fuel ratio is increased, and wherein the second voltage point, at which the decomposition of the water starts, varies according to the air-fuel ratio," as required by independent claim 1 and its dependents. Similar comments apply to the remaining independent claims. Applicant thus requests withdrawal of the above-noted rejections under 35 U.S.C. §103.

In more detail, in JP '388, a width of the limiting current region varies with an element current (i.e., oxygen concentration). However, the end voltage point (second voltage point) of the limiting current region is not determined by the decomposition of water contained in the exhaust gas. Instead, the end voltage point in JP '388 is determined as follows. An air-fuel ratio sensor has a solid electrolyte and two inner and outer electrodes interposing the electrolyte therebetween. The outer electrode is covered with a diffusion resistance film. In a limiting current region, a current flowing through the sensor is produced because oxygen reaching the external electrode through the diffusion resistance film is ionized and is moved in the solid electrolyte due to voltage applied to the sensor. The quantity of the oxygen diffused in the external electrode through the diffusion resistance film is determined by the diffusion resistance film, so that the output current of the sensor is set at a constant value for each of air excessive ratios λ. When the applied voltage is further heightened, electrons of the solid electrolyte are induced to flow through the sensor, so that the output current of the sensor is heightened in an electron conductive region. The end voltage point of the limiting current region is placed between the limiting current region and the electron conductive region (see paragraph [0002]).

In JP '388, the end voltage point of the limiting current region is therefore determined by the induced flow of electrons of the solid electrolyte. JP '388 thus fails to teach or even suggest

the feature of "the limiting current region has a second voltage point at which a decomposition of water contained in the exhaust gas starts", and also the limitation "a width of the limiting current region varies due to the decomposition of the water in accordance with the oxygen concentration such that the width of the limiting current region is wide in a lean region of the air-fuel ratio while the limiting current region is narrow in a rich region of the air-fuel ratio" or the limitation of "the width of the limiting current region in the lean region becomes larger as the air-fuel ratio is increased", as required by claim 1. Even if JP '388 and Suzuki were combined as proposed by the Office Action, the combination would thus not teach or suggest all of the claim limitations.

Dependent claims 29 and 86 now require "the applied voltage control unit sets the inclination of the applied voltage line in a first outer range placed outside the air-fuel ratio detection range on a rich side to be larger than the inclination of the applied voltage line in the air-fuel ratio detection range so as to avoid intersection of the applied voltage line with the sensor characteristic line in the first outer range, and the applied voltage control unit sets the inclination of the applied voltage line in a second outer range placed outside the air-fuel ratio detection range on a lean side to be larger than the inclination of the applied voltage line in the air-fuel ratio detection range so as to avoid intersection of the applied voltage line with the sensor characteristic line in the second outer range." These limitations are not taught or suggested by the three-way combination of Suzuki, JP '388 and Okazaki.

New claims:

New claims 99-148 have been added. Each of these claims is deemed to be allowable for at the reasons discussed above with respect to its base independent claim. Of these new claims,

the subject-matter of the claims 104, 108 and 117 was contained in the previously-presented claims 1, 39 and 45. The subject-matter of the claim 118 was contained in the cancelled claim 47. Also, claims 101, 105, 114, 124, 134, and 137 are supported by, for example, page 24, lines 18-24 of the specification. Claims 102, 106, 115, 125, 135, and 138 are supported by, for example, page 22, line 25 to page 23, line 9 of the specification. Claims 103, 107, 116, 126, 136, and 139 are supported by, for example, Fig. 5, page 22, line 25 to page 23, line 9 and page 23, line 27 to page 24, line 2 of the specification.

Conclusion:

Applicant believes that this entire application is in condition for allowance and respectfully requests a notice to this effect. If the Examiner has any questions or believes that an interview would further prosecution of this application, the Examiner is invited to telephone the undersigned.

Respectfully submitted,

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